

Evaluation of Effects of An Environmental Water Account on Striped Bass

Introduction

CALFED has sponsored an evaluation of potential consequences of an Environmental Water Account (EWA) on selected fish species. Games were run simulating the sets of conditions representing early Stage 1 with a base set of environmental protections which include the Accord and In-Delta AFRP actions (Game 4), late Stage 1 with the same set of protections (Game 2) and early Stage 1 with the Accord but no In-Delta AFRP protection. Each game was run to simulate conditions in 1991 through 1995. Other reports will describe the Games in more detail.

The purpose of this report is to describe effects on striped bass. During gaming done to date, no actions have been taken to benefit striped bass directly. Effects on striped bass reflect the consequences of actions taken to protect delta smelt, chinook salmon and splittail.

Two measures of effect were used. One is a comparison of the number of striped bass estimated to be salvaged at the State Water Project's Skinner Protection Facility. That provides an index to the number of striped bass exposed to entrainment effects. It is an imperfect index for a number of reasons, with one of the more significant being that no attempt was made to estimate how many bass would enter Clifton Court Forebay or suffer mortality.

The second is the magnitude of Delta Outflow in May, June and July. Production of young bass tends to be positively related to Delta Outflow during those months, with direct of entrainment and environmental conditions associated with outflow contributing to the relationship. While a number of other factors also affect striped bass production, outflow in those months provides another imperfect index of effect.

Methodology for Salvage Estimates

Historical salvage estimates were evaluated to decide on an approach to the use of salvage estimates. Both estimates of the number salvaged and yearling equivalents were considered. Recent estimates of survival during the first year of life (Russ Gartz, DFG) were used to compute yearling equivalents from monthly salvage totals. It was assumed that all bass are born on May 1, with the number of fish estimated to be alive at the end of each month used compute yearling equivalents for the number of bass salvaged during the month (Figure 1).

An average of about 80% of the actual salvage and 60% of yearling equivalent salvage occurs in June and July. December, January, February and August each have an average of 5 to 13% of the yearling equivalents. While there are some very significant differences among years in monthly proportions of salvage, it was decided that monthly and annual averages of yearling equivalents are sufficient for the crude evaluation being done at this time.

Effects Based on Salvage

For each game, salvage was estimated for base conditions without EWA actions and for

conditions resulting from EWA actions taken during the game (Figure 2). The average of the annual percentages of historical salvage were all greater than 140% of historical salvage. Those differences were greater in 1993 and 1994 than in other years, with salvage for Game 4 actually being less than for historical conditions in the other three years.

A somewhat different picture emerges from examining total salvage summed over all years for each game (Figure 3). The grand total number salvaged over the 5 years for each game ranges from 123% to 153% of total historical salvage. EWA actions decreased total salvage in all games in January, February and March and increased total salvage in all games from July through November. These seasonal differences totaled over the year roughly canceled each other, so annual differences caused by EWA actions were small, and were positive for two of the three games.

Overall then the primary effect on striped bass entrainment has been the increase from historical conditions associated with shifting exports from the winter and spring to the summer and fall.

Effects Related to Delta Outflow

Average Delta outflows for each month and each game were compared to historical outflows (Figure 4). The greatest changes were in May outflows, which ranged from 4% to 24% greater than historical flows, with differences being the least for Game 5. During June and July, average outflows for all games, except for June of game 5, were within 2% of historical outflows.

EWA actions had positive effects on outflow in June and inconsistent effects in other months.